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December 7, 2016

EX PARTE NOTICE VIA ECFS

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Notice of Ex Parte Presentations
Protecting and Promoting the Open Internet, GN Docket No. 14-28; Matters Related to Measuring Broadband America Program and Performance Measurement, GN Docket No. 12-264; Nineteenth Annual Report on the State of Mobile Wireless Competition, WT Docket No. 16-137; Modernizing the FCC Form 477 Data Program, WC Docket No. 11-10; Universal Service Reform—Mobility Fund, WT Docket No. 10-208

Dear Secretary Dortch:

On December 5, 2016, Chip Strange of Mosaik Solutions ("Mosaik") and Michele Farquhar and Trey Hanbury of Hogan Lovells US LLP, counsel to Mosaik, met with Erin McGrath, Wireless Legal Advisor to Commissioner Michael O'Rielly, on the issues described below. On December 6, Chip Strange and Michele Farquhar met with Nick Degani, Wireline Legal Advisor to Commissioner Ajit Pai, on the above-captioned matters.

During the meetings, Mosaik discussed three issues related to the Federal Communications Commission's ("FCC") use of mobile network coverage and performance data. First, Mosaik discussed the FCC's recently announced plans for exclusive use of FCC Form 477 data in the Mobility Fund II context. Mosaik expressed concerns about both the timeliness and the accuracy of the Form 477 data, which the Federal government will use to make universal service funding decisions. Mosaik noted that the lack of standardization regarding power signal and propagation model requirements will result in the inconsistent reporting of current coverage by operators.[1]

Second, Mosaik addressed the FCC's adoption of the mobile Measuring Broadband America data as a "safe harbor" in the context of the Open Internet transparency rules. Mosaik explained that FCC reliance on a single data source, based on a voluntary consumer application that operates on a

[1] *See* John Gilmer, *Improving FCC Data and Filling the Right Coverage Gaps*, Mosaik (Oct. 24, 2016), http://www.mosaik.com/blog/improving-fcc-data-and-filling-the-right-coverage-gaps/ (attached); *see also Ex Parte* Notice from David LaFuria, Counsel, C Spire Wireless to Marlene H. Dortch, Secretary, FCC, WC Docket No. 10-90, WT Docket No. 10-208 (filed Oct. 21, 2016); *Ex Parte* Notice from David LaFuria, Counsel, United States Cellular Corporation to Marlene H. Dortch, Secretary, FCC, WC Docket No. 10-90, WT Docket No. 10-208 (filed Oct. 27, 2016).

limited number of devices, will produce an incomplete depiction of mobile network coverage and performance.[2] The Bureau's selection of a single safe harbor and remaining ambiguity about whether mobile operators may use other network performance data providers creates disincentives for operators to explore alternative private sector data collection and network experience solutions.

Third, Mosaik expressed its concern that the FCC's decisions on data creation and distribution will harm small businesses, such as Mosaik, that for years have offered data collection and information processing services to the FCC and the industry. The Federal government has a longstanding policy, captured in OMB Circular A-76, of relying on the private sector for any needed services that are not "inherently governmental" to ensure Americans "receive maximum value for their tax dollar."[3] The FCC's continued reliance on companies in the competitive private sector data collection and processing industry would be consistent with this longstanding policy.

Pursuant to Section 1.1206(b)(2) of the Commission's rules, an electronic copy of this letter is being filed in the above-referenced dockets. Please direct any questions regarding this filing to the undersigned.

Respectfully submitted,

/s/ Michele Farquhar

Partner
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Attachments

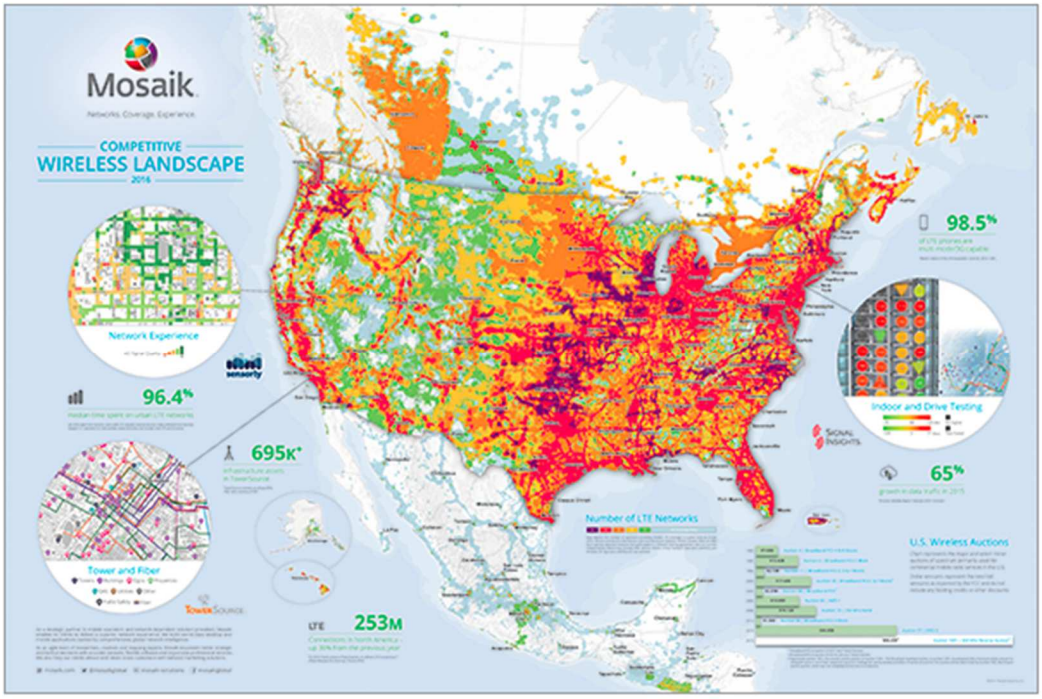
cc: Erin McGrath
Nick Degani

[2] *See Ex Parte* Letter from Bryan Darr, President and CEO, Mosaik to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-28 (filed July 15, 2016) (attached); *see also Ex Parte* Letter from Krista Witanowski, AVP, Regulatory Affairs, CTIA, and Elizabeth Barket, Law & Regulatory Counsel, Competitive Carriers Association to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-264, WT Docket No. 16-137, GN Docket No. 14-28 (filed Aug. 10, 2016).

[3] Office of Management and Budget, Circular A-76, *Performance of Commercial Activities* (May 29, 2003), *available at* http://bit.ly/29UNmO3.

Improving FCC Datasets & Filling the Right Coverage Gaps

By: John Gilmer - Vice President, Data Integrity



The recent release of the Federal Communications Commission's report, "Working Toward Mobility Fund II: Mobile Broadband Coverage Data and Analysis," raises important questions about data integrity and reliability. Which Americans have access to mobile broadband? Where? And at what speeds?

Wireless operators depend on accurate answers to these questions to make intelligent decisions about where to invest in their networks, how much to spend on advertising and how to establish pricing and terms of service for consumers. Meanwhile, the Federal government has proposed to make universal service funding decisions valued at hundreds of millions of dollars annually based on how these types of questions are resolved.

Unfortunately, the data the FCC has released so far falls short of the accuracy and completeness necessary for businesses, the government or consumers to assess wireless broadband coverage in the United States.

So why does the FCC Form 477 network coverage data fall short?

It's complicated. To start, the FCC seems to have assumed that commercially available data – including the information we generate here at Mosaik – overstates the wireless broadband coverage of network operators.

Wireless carriers compete on coverage, and the operators may have an incentive to exaggerate their coverage to improve their market position. This shouldn't come as a surprise to anyone since there's always the potential for a merchant to exaggerate the benefits of a product they want to sell. Just ask anyone who has bought a house, or a car, or anything for that matter. The potential for salesmanship is not exactly news to companies in the private-sector broadband performance measurement industry,

either. On the other hand, the wireless industry relies on recurring fees from its customers rather than just a single sale (like a house or car), and this should also be taken into consideration. In this business model, customer satisfaction can have a large effect on an operator's revenue, so it's in the operator's best interest to not exaggerate their coverage to the point that it sets false customer expectations. As a company with nearly 30 years' experience in helping the wireless industry measure, analyze and visualize wireless network coverage, we pride ourselves on delivering quality and impartial data.

But the FCC's most recent *Mobile Competition Report* says the agency relied on data reported directly to the government by the operators to avoid overstating the network coverage of mobile broadband operators. The FCC implied that its data, unlike data provided by the private-sector, would better correspond to actual user experiences.

If the FCC's assumptions about commercially available, operator marketed coverage data significantly overstating the available network coverage were true, the FCC's maps should show substantially *smaller* coverage areas than the maps that commercial providers generate.

But they don't.

We compared coverage charts using commercial data-collection methods against the government-collected data shown on Form 477. The data did not change substantially, and the slight variances could very well be attributed to when the data was collected.

January 2016 Mosaik collection and FCC analysis

Table VI.A.i
***Estimated* Wireless Coverage in the U.S. by Provider**
Mosaik, Centroid Method, January 2016

Provider	Number of Blocks	POPs Contained in Those Blocks	% of Total US POPs	Square Miles Contained in Those Blocks	% of Total US Square Miles	Road Miles Contained in Those Blocks	% of Total US Road Miles
U.S. Total (actual)	*10,609,302*	*312,471,328*	*100.0%*	*3,550,852*	*100.0%*	*6,817,734*	*100.0%*
AT&T	10,164,000	310,414,237	99.3%	2,551,001	71.8%	6,203,234	91.0%
Sprint	7,191,701	280,490,010	89.8%	833,583	23.5%	3,162,984	46.4%
T-Mobile	8,528,090	294,917,583	94.4%	1,485,820	41.8%	4,472,563	65.6%
Verizon Wireless	9,897,265	304,609,818	97.5%	2,411,071	67.9%	5,987,063	87.8%

Source: Based on centroid analysis of January 2016 Mosaik and 2010 Census data. It is important to note that the number of service providers in a census block represent network coverage only. Network coverage does not necessarily reflect the number of service providers from which any particular individual or household in a given area may choose. These coverage calculations, while useful for measuring developments in mobile coverage, have certain limitations that likely result in an overstatement of the extent of mobile coverage.

December 2015 Form 477 collection and analysis

Table VI.A.ii
***Estimated* Wireless Coverage in the U.S. by Provider**
Form 477, Centroid Method, December 2015

Provider	Number of Blocks	POPs Contained in Those Blocks	% of Total US POPs	Square Miles Contained in Those Blocks	% of Total US Square Miles	Road Miles Contained in Those Blocks	% of Total US Road Miles
U.S. Total (actual)	*10,609,302*	*312,471,32*	*100.0%*	*3,550,852*	*100.0%*	*6,817,734*	*100.0%*
AT&T	10,162,425	310,397,72	99.3%	2,552,337	71.9%	6,206,628	91.0%
Sprint	7,733,234	288,642,24	92.4%	1,012,594	28.5%	3,599,457	52.8%
T-Mobile	8,615,379	295,563,67	94.6%	1,532,497	43.2%	4,558,616	66.9%
Verizon Wireless	9,851,397	304,250,34	97.4%	2,383,851	67.1%	5,944,300	87.2%

Source: Based on centroid analysis of December 2015 Form 477 and 2010 Census data. It is important to note that the number of service providers in a census block represent network coverage only. Network coverage does not necessarily reflect the number of service providers from which any particular individual or household in a given area may choose. These coverage calculations, while useful for measuring developments in mobile coverage, have certain limitations that likely result in an overstatement of the extent of mobile coverage.

Many of the concerns raised about the potential for carriers to exaggerate their coverage are equally, if not more, applicable to the Form 477 data the FCC started to collect, than to the information collected

and curated by private-sector companies such as Mosaik. For example, the FCC has not established any definitive signal power or propagation model requirements for producing coverage patterns. This means that reported coverage might not be created consistently between operators. Nor has the FCC tried to account for the actual user experience, which is based on extensive collection of end-user generated data and historical deployment patterns, as Mosaik and other commercial providers do.

Over the years, Mosaik has helped the industry evolve its coverage measurement and analysis. From being an early leader and innovator in marketing mobile network coverage maps, to providing in-depth geospatial analytics, we help illustrate the entire wireless industry landscape. But that's not all. We continue to add more robust capabilities, including crowdsourced and private collection of end user wireless network experiences, enhanced in-building measurement and improved analytics to help validate our ever-growing datasets. With so many data-rich features available, you might wonder why the FCC would want to replicate what the commercial market already provides. We did.

Mosaik is the classic story of American small business. We rose from an idea that started nearly 30 years ago, driven by an entrepreneurial spirit with a focus on neutrality and integrity. To this day, Mosaik is a proud partner to many global members of the wireless ecosystem.

We have highly flexible licensing models and welcome alternative licensing options as needed by both public and private sector clients. Like all data providers, our models are predicated on certain licensing protections. However, I am confident our data products are delivered at significantly lower costs, and are more timely and accurate than what the FCC spends to create and manage data itself.

The public needs better data about broadband performance than the Form 477 process has generated. We anticipate working with the FCC and other stakeholders to develop a program to enhance the reporting of network availability and performance for Mobility Fund-Phase II, and other important government priorities.

The private-sector can provide more accurate, timely and complete broadband performance measurement data than the FCC can. Working together with stakeholders from the entire wireless industry, we remain focused on offering innovative, easily accessible, best-in-class broadband performance data and analysis to everyone who needs it.

July 15, 2016

EX PARTE VIA ECFS

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Room TW-A325
Washington, D.C. 20554

Re: Guidance on Open Internet Transparency Requirements
GN Docket No. 14-28

Dear Ms. Dortch:

Mosaik respectfully submits this letter to outline concerns regarding the May 19, 2016 Federal Communications Commission Public Notice on wireless network-performance measurement.[1] Without prior notice or public comment, the FCC's Public Notice unnecessarily narrowed the pool and types of available wireless network data and selected the information provided by Measuring Broadband America ("MBA") as the safe harbor for information disclosures required by the 2015 *Open Internet Order*.[2] The FCC should have sought public comment on its approach prior to its release. Had the FCC done so, the agency would likely have realized that allowing the use of a greater variety of data sources and collection technologies would ensure more detailed, robust and accurate wireless network-performance measurements. The FCC should solicit public comment and reconsider the approach taken in its May 29, 2016 Public Notice.

About Mosaik

Mosaik provides a unique combination of datasets, network-experience software and geospatial-analytical services to an array of carriers, MVNOs, infrastructure and telematics companies. Mosaik has the largest mobile network coverage, spectrum and infrastructure database in the world and has

[1] *Guidance on Open Internet Transparency Rule Requirements*, Public Notice, GN Docket No. 14-28, DA 16-569 (rel. May 19, 2016) ("Public Notice"). CTIA and Competitive Carriers Association ("CCA") filed applications for review of this Public Notice. *See* Application for Review of CTIA, GN Docket No. 14-28 (filed June 20, 2016) ("CTIA Application for Review"); Application for Review of Competitive Carriers Association, GN Docket No. 14-28 (filed June 20, 2016) ("CCA Application for Review").

[2] Both CCA and CTIA have explained how the FCC's decision unlawfully seeks to establish new rules without a Notice of Proposed Rulemaking. *See* CCA Application for Review at 5; CTIA Application for Review at 3.

provided unbiased support for the telecommunications industry for 28 years. Mosaik's telecommunications databases address spectrum, infrastructure, wireless and wired technologies, including 1,750 mobile networks from more than 850 carriers worldwide. As of the second quarter of 2016, Mosaik's mobile-coverage database in the United States includes 250 networks from 130 carriers. Mosaik has also made considerable investment to augment its core network-coverage database, which collects billions of measurements every year by leveraging end-user devices as network sensors and by recording network performance across mobile and Wi-Fi networks. Mosaik combines these considerable datasets and software assets to offer a comprehensive representation of the wireless user experience. Mosaik currently provides datasets or services to 22 of the largest 25 mobile operators in North America and has provided data to the FCC for 12 years.

Diverse Data Sources and Analytical Methods Increase Accuracy

Mobile network-performance measurements are far more accurate and reliable when the analysis draws from diverse datasets and uses multiple collection methodologies. Assembling and processing data to create a composite view of network performance can overcome method-specific limitations and anomalies and produce more accurate and reliable measurements than using a single method or process. Drive-testing, for example, can be a useful data-collection tool for measuring wireless networks outdoors. It can also be expensive and impractical, especially in rural and remote areas, while also not considering network experiences indoors. Combining drive-testing with other tools – such as crowdsourcing and indoor testing options, when collected pursuant to well-designed methodologies – can allow for a more robust and accurate measure of wireless network speeds and network coverage than drive-testing alone. Aggregating the results from multiple collection methodologies and data sources provides researchers with more depth and breadth of information because each source of data acts as a check on the accuracy of the other sources, which helps identify inconsistencies and discrepancies.

In its Application for Review of the Public Notice, CTIA described the narrow pool of data available from the initial MBA results, which will "only utilize scheduled test results from Android devices and will exclude data collected from iPhone users."[3] CTIA noted that these limitations "skew results and provide consumers with a very imperfect picture of network performance."[4] CTIA is correct. Any safe-harbor provision should encourage the use of multiple data-collection methodologies and diverse datasets. Across industries, companies that collect and use different data sources perform better.[5] In the wireless context, combining a variety of sources of data, including crowdsourcing, drive-testing, and signal measurements produces the highest level of accuracy.

The MBA Data Is Seriously Flawed

While the MBA data might offer one type of relevant information, the MBA data suffers from serious flaws that promise confusing, inaccurate and inconsistent information about wireless network performance. The MBA mobile broadband effort uses a speed test app developed by the contractor

[3] CTIA Application for Review at 13.

[4] *Id*.

[5] Andrew McAfee and Erik Brynjolfsson, *Big Data: The Management Revolution*, HARVARD BUSINESS REVIEW (Oct. 2012), http://bit.ly/11bRO4X (explaining how the airline industry improved flight arrival and departure time predictions by moving from a single source of data to multiple sources of data).

SamKnows.[6] Consumers with either Android or iPhone devices can download the app, which will then measure performance in four active categories (download speed, upload speed, latency, and packet loss), as well as certain passive metrics, such as signal strength and device manufacturer and model. The FCC encourages volunteers that download the apps to use automated testing, but users can disable automated testing and conduct manual tests instead.[7]

The FCC states that mobile broadband providers can disclose actual performance metrics for a Cellular Market Area ("CMA") based on the data collected by the MBA program for that CMA. The MBA program, however, reports data averaged across CMAs, which can produce misleading results.[8] In the Los Angeles CMA, for example, median downlink speeds range from 25.1 Mbps to 9 Mbps. As other commenters have noted, averaging this data could lead to performance results that are misleading because each carrier's typical speeds vary across large areas.[9]

This variation also skews the MBA data in such a way that reporting either the mean or median could be misleading. Neither the mean nor median are necessarily representative of the speeds in a given test area, especially if the area has both urban and rural sections. A better approach is to engage with experts to discuss and address geographic considerations instead of arbitrarily using outdated CMA boundaries. Mosaik, and perhaps other companies, have the statistical expertise to understand and develop methodologies and innovative analytical outputs to accurately reflect network experiences, beyond the limited MBA.

More generally, the all-volunteer pool of SamKnows app users is unlikely to be representative of the population, and the MBA website acknowledges that "manual testing can lead to biased results when performed only at specific times or places, and may provide a less accurate picture of overall broadband performance."[10] For the data to be useful, the data must be collected in an organized and systematic way, not merely aggregated and averaged, and then processed in conjunction with other performance-measurement tools. Relying on a single source of data – especially when that data source suffers from serious flaws – introduces a high likelihood of misleading information that will not accurately represent actual network performance.

An Insufficient and Skewed Safe Harbor Will Frustrate Informed Consumer Choice

Reliance on a single, skewed data source also has the potential to frustrate consumer choice. The SamKnows app relies on voluntary participation and can collect when and where wireless subscribers who have downloaded the app trigger the measurement function. This type of selective, subjective data collection can yield uneven, misleading results. Rural areas, for example, will have far fewer points of measurement than urban areas, which can reduce reliability. Similarly, consumers may choose to trigger the measurement function only when they have experienced coverage limitations or other performance issues, which reduces reliability still further. Moreover,

[6] *Measuring Mobile Broadband Methodology – Technical Summary*, FCC.GOV, http://fcc.us/2a0mz60 (last visited July 7, 2016).

[7] *Measuring Mobile Broadband Performance*, FCC.GOV, http://fcc.us/2a0mz60 (last visited July 7, 2016).

[8] Comments of RootMetrics, GN Docket No. 14-28 (filed June 27, 2016).

[9] *Id*. at 7.

[10] *Measuring Mobile Broadband Performance*, FCC.GOV, http://fcc.us/2a0mz60 (last visited July 7, 2016).

because consumer willingness to download and use a government-sponsored app may vary by demographic, customer variations among carriers could distort performance measurements in unpredictable ways. Furthermore, consumers have limited incentive to participate in the program and this lack of incentive will result in limited data collection. The end result of these and other limitations of the voluntary app approach are difficult to assess, but are highly unlikely to offer an accurate depiction of network performance. Consumer reliance on these flawed measurements would frustrate informed consumer choice and could ultimately thwart the Commission's end goal of improved wireless competition.

Instead of choosing a safe harbor based on a voluntary app that operates on a limited range of wireless devices, the Commission should engage with carriers and third-party data and software providers as well as industry and public resources to identify state-of-the-art wireless network information-collection techniques and vendors. While the MBA is limited to broadband performance, the Commission is also concerned with closing "coverage gaps" and ensuring broadband networks are available throughout the country.[11] The Commission should ensure that comprehensive data collection and analytical options are leveraged to fulfill emerging information needs. Measuring wireless broadband coverage and network performance is extremely complex and requires field-proven methodologies and statistically valid sampling techniques. When attempting to measure performance and evaluate consumer satisfaction, more intelligence and more data are needed from diverse sources, particularly from parties that have institutional knowledge and background in this area. The Commission should seek further comment on its network-performance measurement safe harbors or hold a workshop to collect much-needed information on how to improve its safe-harbor approach for the benefit of wireless consumers.

A Single, Ill-Suited Safe Harbor Will Stymie Private-Sector Investment and Innovation

Identification of the SamKnows app as the sole safe-harbor data source threatens to supplant established private-sector jobs and investment in wireless performance measurement. The federal government long ago adopted a policy against the displacement of private-sector jobs through agency action. OMB Circular A-76 directs agencies to "rely on the private sector for needed commercial services."[12] Relying on commercial competition, OMB has explained, helps "ensure that the American people receive maximum value for their tax dollar."[13]

In the wireless network performance measurement sector, private-sector companies have developed and refined sophisticated data-collection and analytical techniques for more than twenty-five years.

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[11] *See, e.g.*, FCC, CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN 3 (2010) ("*National Broadband Plan*"), http://bit.ly/1JHqKMN (identifying the goal of the FCC's National Broadband Plan as developing "broadband networks that reach higher and farther, filling the troubling gaps we face in the deployment of broadband networks, in the adoption of broadband by people and businesses and in the use of broadband to further our national priorities").

[12] Office of Management and Budget, Circular A-76, *Performance of Commercial Activities* (May 29, 2003), *available at* http://bit.ly/29UNmO3. The circular applies to executive branch departments and agencies.

[13] *Id.* The principles of OMB Circular A-76 originated in the Eisenhower Administration as a statement of federal policy, and it developed into the formal A-76 policy statement in 1966. *See* VALERIE ANN BAILEY GRASSO, CONG. RESEARCH SERV., R40854, CIRCULAR A-76 AND THE CURRENT MORATORIUM ON DOD COMPETITIONS 1 (2013).

Wireless carriers, enterprise customers and the government rely on the market to determine the optimal performance-measurement information based on how well those firms collect, process and analyze data from a variety of sources. The current competitive market for network-performance measurement creates incentives for continuous investment and innovation. Private-sector companies, including Mosaik and other vendors, have responded to these incentives by pouring considerable financial resources into perfecting data-collection methods and analytical techniques that offer much greater reliability, accuracy and currency than voluntarily used, crowd-sourced apps.[14] But the FCC's proposed safe harbor threatens to upend this functioning market for network-performance measurement.

Government identification of a single, seriously flawed method offered by a single preferred vendor as the sole safe harbor for broadband-performance measurement would discourage private investment in data collection and information processing. However defective and distorted the results of the government-endorsed benchmark might be, consumers could view the safe harbor as the more trusted, more accurate methodology simply by virtue of the FCC's having selected it. Carriers would have less incentive to use third-party vendors such as Mosaik to validate consumer network experiences, and third-party vendors would, in turn, have less incentive to continue to refine and perfect their network-measurement and analytical techniques. In this way, the FCC's attempt at greater transparency could perversely lead to consumers having access to less current and less accurate information about wireless carriers' network performance than they enjoy today.

* * * *

The Public Notice selected the MBA as the safe harbor for the disclosures of mobile broadband providers without public input. Informed comment from the public would produce a better result.[15] The FCC should build on private-sector investment and revisit its identification of a single, flawed standard from a single vendor as the safe harbor for broadband-performance measurement. Doing so promises to increase informed consumer choice and ultimately promote increased competition among wireless broadband service providers.

Under Section 1.1206(b)(2) of the Commission's rules, an electronic copy of this letter is being filed in the above-referenced proceeding.

Respectfully submitted,

/s/ Bryan Darr

Bryan Darr
President and CEO
Mosaik

CC: Michele Farquhar, Hogan Lovells US LLP
Trey Hanbury, Hogan Lovells US LLP

[14] CTIA Application for Review at 14 (listing "third-party data sets that are far more robust than the MBA program," including OpenSignal, Sensorly, Mosaik, Ookla, and Nielsen).

[15] CCA Application for Review at 9.